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17. ABSTRACT (MAX. 250 WORDS)

The third year of arithmetic instruction should utilize social settings for learning as well as manipulative and graphic materials.

The number system, in counting, should develop the skills of counting by 3's and 4's and of recognizing odd and even numbers. Children should gain the ability to read and write numbers to four places.

The whole numbers unit should provide review and drill of addition and subtraction up to 18 as well as teaching zero combinations, column addition, and borrowing in subtraction. Multiplication and division work should be extended to zero combinations, multiplying two-place numbers, and dividing tens and ones by a one-place divisor.

Money should be used to teach the decimal form. Fractions should develop the idea of division and parts of a group. Measurement should emphasize parts of the day, use of the calendar, linear measure, liquid measure, weight, thermometer, and graphs. The geometric forms of the circle, square, triangle, rectangle, semicircle, cube, sphere, and hemisphere should be re-inforced.

Specific teaching approaches are suggested in outline form. Materials are to be used with the guide, Arithmetic Program Primary Unit, Philadelphia Public Schools (1963).

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GREAT CITIES SCHOOL IMPROVEMENT PROGRAM
SCHOOL DISTRICT OF PHILADELPHIA

ARITHMETIC PROGRAM
THIRD YEAR

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GREAT CITIES SCHOOL IMPROVEMENT PROGRAM
SCHOOL DISTRICT OF PHILADELPHIA

THIRD YEAR

(To be used with the Guide, "Arithmetic Program Primary Unit," Philadelphia Public Schools, 1963)

The emphasis in the teaching of arithmetic is on the meaning of each learning. To be sure that the children understand numbers, the processes and the mathematical relationships, it is necessary to utilize social settings for the learnings as well as to use manipulative and graphic materials. The children's thinking should be checked by discussions and questions. Extended learnings should be provided to afford the children greater insights into the learnings and to develop curiosity and interest in arithmetic.

I. Number System

A. Counting

1. Develop the skill of counting by 3's and 4's.

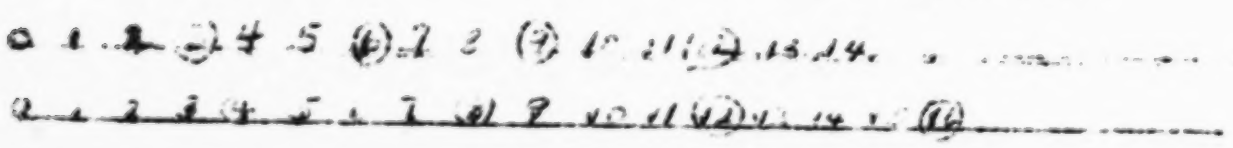
a. Establish the understanding that counting by 3's is the same as multiplying by 3.

b. Help the children to discover that they think two numbers and say the third number.

c. Establish the understanding that counting by 4's is the same as multiplying by 4.

d. Help the children to discover that they think three numbers and say the fourth number.

e. Count by 3's and 4's on a number chart and a number line.



2. Develop the skill of recognizing odd and even numbers.

3. Use counting as a tension reliever between lessons.

B. Reading and writing numbers to four places

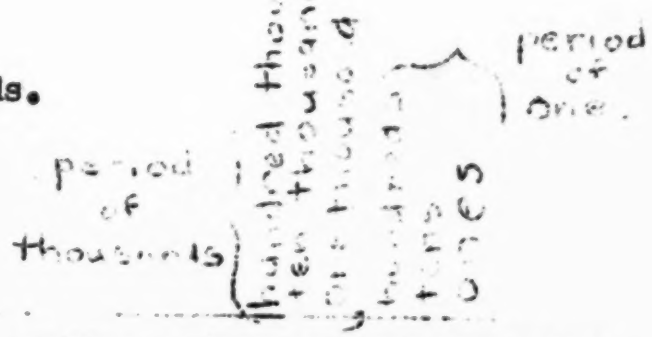
1. Review reading and writing numbers to hundreds.

2. Teach relative and absolute value of numbers.

1,652= one thousand +6 hundreds +5 tens +2 ones.
1,652= 16 hundreds +5 tens +2 ones.
1,652= 165 tens +2 ones.
1,652= 1,652 ones.

3. Teach use of comma.

Commas separate periods.

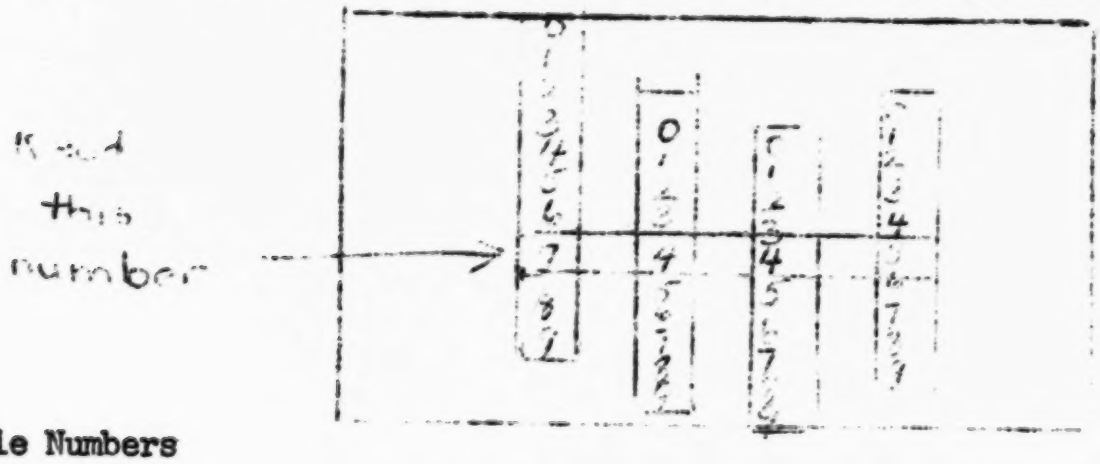


4. Avoid the use of "and" in reading numbers except in reading numbers containing fractions.

5. Make use of a chart with place value pockets to illustrate numbers. Use small pockets with toothpicks for individual work.

Thousands	Hundreds	Tens	Ones

6. Make use of classroom made odometers to read and write numbers.



II. Whole Numbers

A. Addition and Subtraction

1. Review and drill combinations to 18.

2. Teach adding by endings in higher decades.

$$\begin{array}{rrrrr} 3 & 13 & 23 & 33 & 43 \\ 5 & 5 & 5 & 5 & 5 \\ \hline 8 & 18 & 28 & 38 & 48 \end{array} \text{ etc.}$$

3. Teach bridging the tens and apply to higher decades.

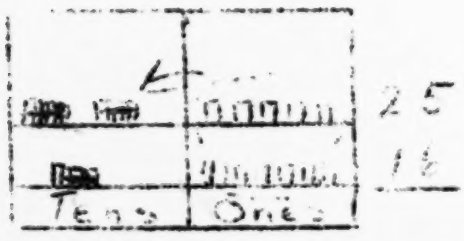
5	15	25	35	45	
8	8	8	8	8	
13	23	33	43	53	etc.

4. Teach zero combinations

Generalization: When a zero is added to or subtracted from a number, the quantity remains the same.

5. Addition with carrying a ten

a. Teach as a regrouping process. Allow the children many opportunities to work with place value pockets. Regroup sticks into bundles of tens.

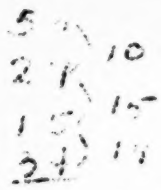


b. Children may record the carried ten at the top of the ten's column as long as necessary but they should be encouraged to discard the use of this crutch as soon as possible.

c. Problems involving the use of money result in a more easily understood approach.

6. Column addition

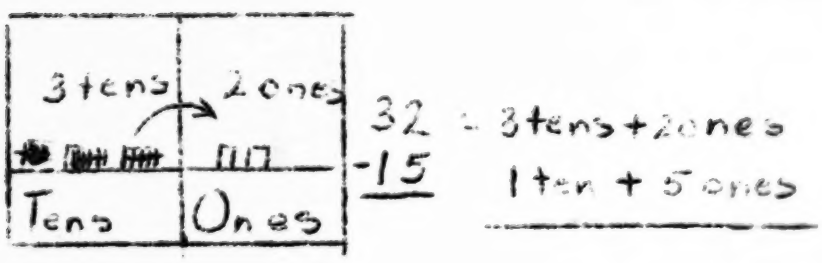
a. Add two place numbers with 4 addends.



Children may use helping numbers until skillful enough to discard them.

7. Subtraction with taking and using a ten (borrowing)

a. Teach as a regrouping process using many concrete experiences to establish the understanding.



b. Practice differentiating those examples where regrouping is necessary from those where it is not needed. This may be done by placing a circle around the larger digit in the one's column.

$$\begin{array}{rrr} 23 & 46 & 93 \\ -\,19 & -\,24 & -\,73 \\ \hline & & \end{array}$$

c. Encourage children to estimate answers. Use rounded off numbers.

d. Have children recheck answers.

e. Have children suggest several ways to obtain the answer.

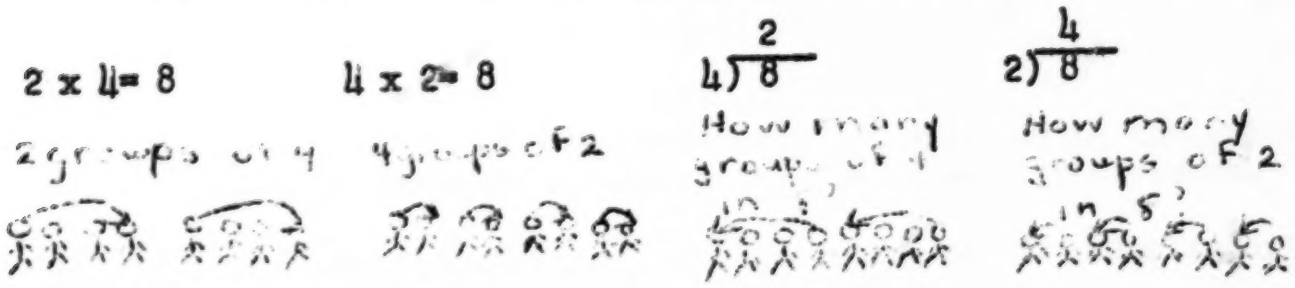
B. Multiplication and Division.

1. Review the facts of 2's and 3's.

2. Organize these known facts into a table. This organization comes when the children are working at the abstract level and have acquired understanding.

3. Teach the remaining facts to complete all the multiplication and division facts through the 9's.

4. Teach the related facts of multiplication and division.



5. Extend the understanding of multiplication and division to zero combinations.

Generalization: Any number multiplied or divided by zero equals zero.
Zero multiplied or divided by any number equals zero.

6. Develop the understanding of multiplying two-place numbers.

Multiplication - tens

$$\begin{array}{rll} & 4 \text{ tens} = & 40 \\ \times & 2 & \\ \hline & 8 \text{ tens} = & 80 \end{array}$$

Multiplication tens and ones.

$\begin{array}{r} 42 \\ \times\ 2 \\ \hline \end{array}$ = $\begin{array}{r} 40 \\ \times\ 2 \\ \hline \end{array}$ and $\begin{array}{r} 2 \\ \times 2 \\ \hline \end{array}$ then $\begin{array}{r} 42 \\ \times\ 2 \\ \hline \end{array}$

Multiplications with carrying in the tens.

$\begin{array}{r} 46 \\ \times 2 \\ \hline \end{array}$ = $\begin{array}{r} 40 \\ \times 2 \\ \hline 80 \end{array}$ and $\begin{array}{r} 6 \\ \times 2 \\ \hline 12 \end{array}$ and $\begin{array}{r} 80 \\ 12 \\ \hline 92 \end{array}$

Children must understand place value.

There should be practice at the concrete and graphic level before the introduction of the abstract level.

Correlate this learning with carrying in addition.

7. Dividing tens and ones by a one-place divisor.

Division should be introduced with the use of concrete material and the use of place value pockets.

$4\overline{)48}$ We read this how many 4's are in 48?

To establish meaning we say how many groups of 4 are in 40? $4\overline{)40}$ $\begin{array}{r} 10 \end{array}$ how many groups of 4 are in 8?

$4\overline{)8}$

Children should have the opportunity of discovering the proced in division instead of memorizing the "steps" in division.

The two ideas in division, containing and partitioning (sharin should be well established.

The fractional idea of division

$3\overline{)18}$ is $\frac{1}{3}$ of 18

III. Use of Number

A. U.S. Money

The decimal form of recording U.S. money is used.

B. Fractions

Fractional part of a whole: $\frac{1}{4}, \frac{2}{4}, \frac{1}{3}, \frac{1}{2}$.

Fractional part of a group.
Fractional idea of division.

C. Measurement

1. Time: Hours in a day
Minutes in an hour
A.M. and P.M.
Five minute intervals
Months and days.

2. Use of calendar.

3. Linear measure.

12 inches = 1 foot
3 feet = 1 yard
36 inches = 1 yard

4. Liquid measure.

1 cup = $\frac{1}{2}$ pint
2 cups = 1 pint
2 pints = 1 quart
4 quarts = 1 gallon

5. Weight

16 ounces (oz.) = 1 pound (lb.)

6. Thermometer

7. Graphs

IV. Geometric Forms

Circle, square, triangle, rectangle, semicircle, cube, sphere, hemisphere.

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